

**BUSINESS CYCLE SYNCHRONIZATION IN MONETARY UNION**

*Vaclav Rybacek\**

*University of Economics in Prague, Department  
of Institutional Economics*

**Abstract**

*The purpose of this paper is to examine the self-enforcing nature of business cycle synchronisation in the process of monetary integration. Application of value added concept for description of business cycle and as a indicator of total economic activity is also discussed in the paper.*

**Keywords:** monetary integration, business cycle, GDR, GDP

**JEL-codes:** E22, E32, F36

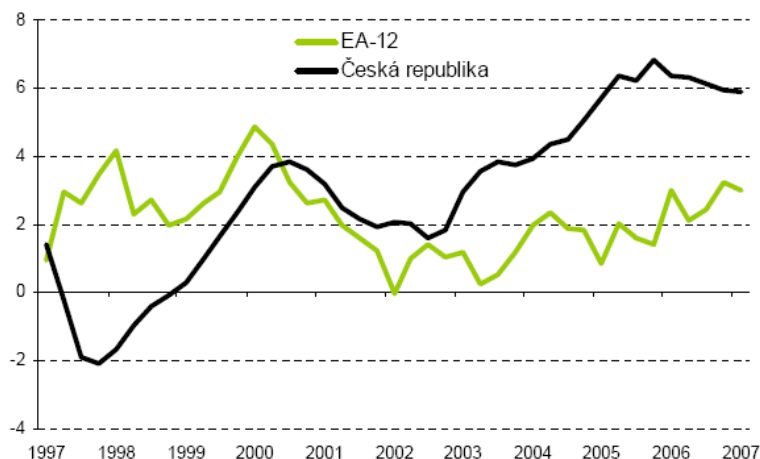
**1. Introduction**

Cyclical development in the economic activity is an important argument in discussions about monetary integration. Expedience of monetary integration is derived from the synchronization of business cycle described by development of widely used indicator - the GDP. Following graph shows the cyclical movement of GDP in the Czech Republic and twelve countries of eurozone (EA-12). As it can be seen here, there exists an asynchronous cyclical development, hence it is said that membership in the European Monetary Zone is not suitable for the Czech Republic.

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\* Vaclav Rybacek is at the University of Economics in Prague, Department of Institutional Economics.

**Chart 1: Business cycle in the countries of EA-12 and in the Czech Republic (year-to-year changes of GDP in %)**



**Source: Analysis of harmonization, CNB**

The approach mentioned above raises many questions. First of all, is GDP the best tool for business cycle description?<sup>20</sup> If the answer is negative then another question follows: How should we record such a business cycle? Construction and computation of a more appropriate indicator for business cycle description is question under debate in this paper. The aim of this paper is also to find an answer to a related question - whether business cycle synchronization is a self-enforced feature of monetary integration<sup>21</sup>.

### **GDP and economic theory**

Widely used indicator GDP is treated as an integral part of modern macroeconomics, in addition to that GDP is said to be crucial guideline for economic policy. GDP is defined as a sum of value added by each firm, government institution and productive households<sup>22</sup> and is in the centre of the system of national accounts. Dynamic development in the case of GDP computation and national accounts as a whole dates back to the fourth decade of the 20th century in connection with rising demand of politicians for statistical data describing the development of economic systems. A substantial contribution to

<sup>20</sup> Business cycle is usually defined as deviations of real gross national product (GNP) from trend and trend is defined as steady state in the sense of growth of output per capita, consumption, investments, etc. corresponding to growth of technology. See Kydland, Prescott [1990] For purpose of this analysis, there is no need to differentiate between GNP and GDP.

<sup>21</sup> If it is this case, it is meaningless to wait for synchronization in the course of GDP.

<sup>22</sup> Looking at GDP from a different angel, GDP is the monetary amount that forms the incomes that are distributed, redistributed, consumed or saved. See Understanding National Accounts, str. 17.

the elaboration of the system of national accounts was brought by Simon Kuznets. This economist is strongly connected with so-called „Keynesian revolution“, hence, it is not surprising that the national accounts are based on methodological fundaments of Keynesianism<sup>23</sup>.

### *Production*

Production is the cornerstone of the system of national accounts. This item covers all goods and services produced in an economy within given period intended for final consumption, intermediate consumption or for export. According to classical economics<sup>24</sup>, annual production can be used in two ways - for production or for consumption.<sup>25</sup> Larger part of production is intended for production purposes, for renewal of capital, reserves, or for capital widening. Thank to accumulation of capital, process of capital widening leads to increasing production in following periods. The remaining part of annual production is used for consumption purposes<sup>26</sup>.

By this two alternative uses is annual production fully exhausted. Naturally, the more is intended for consumption purposes, the less can be used for production purposes, and *vice versa*. Relation between consumption and investment is aptly expressed by Röpke<sup>27</sup>:

*„The formation of real capital (investments) must be balanced by a restriction of consumption, ..., the inference is: that the proportion between consumption and real-capital formation cannot be changed at will without causing disturbances.“*

A restriction of consumption will enable creation of savings that are used for purchase of capital goods, in other words, savings are necessary for capital widening and subsequent rise of production. Because savings are spent on production purposes, there are no outflows of monetary units (savings) from economic system. These funds (savings) are unlike consumption expenses spent on the production purposes in the sphere of capital goods. Hence, savings have an

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<sup>23</sup> First of all, the connection between keynesianism and national accounts is the concept of value added as a basis for description of economic performance. This concept is said to avoid so-called „error of double-counting“. Another linkage is also its emphasis on consumption, narrow definition of productive activities, net values, etc.

<sup>24</sup> Adam Smith or James Mill.

<sup>25</sup> Smith [1904]

<sup>26</sup> Mill [1808]

<sup>27</sup> Röpke [1936], p. 99

impact on demand for capital goods. This fact was formulated by Adam Smith as a so-called „saving-is-spending“ theorem.<sup>28</sup>

Classical economics tells us that we have to save a part of an annual production for production purposes to enable future consumption to increase. As Röpke notes, decrease of consumption can be only relative, consumption and productive expenditure can grow simultaneously, because of growth of total production<sup>29</sup>. Let us compare this theoretical relation with data provided by the system of national accounts. Total production is the basic item of this system and is recorded in the production account. Capital account provides information about the amount of capital expenditures within given period according to the methodology of the national accounts (so-called „gross capital formation“).

Following table shows overview of changes in the rate of growth in capital expenditures and production (both items are recorded in current prices). In year 1998, the rate of growth of production decreased by almost 2 percentage points, this development in production was preceded by 21 percentage points slump in capital expenditure in the previous year. The same is true for year 2002. These years can be considered to be in accord with logical relation between investments and production.

**Table 1: Changes in rate of growth of production a investments, Czech republic, 1998-2007**

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Production	-1,97	-6,25	7,51	-0,88	-6,49	3,13	4,71	-3,92	6,5	-2,3
Investments (t-1)	-21,42	5,41	-3,27	15,02	-6,74	-6,51	-1,96	11,71	-11,34	12,3

**Source: Czech statistical office, own calculation**

Year 1999 was characterized by a strong fall in the growth of production. But this reduction was preceded by accelerating rate of capital expenditure<sup>30</sup>. This situation has been repeated in years 2001, 2005 and 2007. So, in these four years real development does not agree with theoretical explanation of relation between investments and production. On the contrary, in years 2000, 2003, 2004 and 2006 we can see accelerating growth of production, which was preceded by deceleration in the growth of capital expenditures. Briefly summarized, data are in accordance with theory only for two years of the examined period. So the

<sup>28</sup> What is saved is also consumed, but the consumers of savings are not the consumers in common sense. „That portion which he annually saves, as for the sake of the profit it is immediately employed as a capital, is consumed in the same manner, and nearly in the same time too, but by a different set of people, by labourers, manufacturers, and artificers, who reproduce with a profit the value of their annual consumption. His revenue, we shall suppose, is paid him in money.“ See Smith, Book II, Chapter III.

<sup>29</sup> Röpke [1936], p. 109

<sup>30</sup> Bear in mind that in this case we take investment as gross capital formation. By this item are not covered all expenditures made for the purpose of subsequent consumption.

theoretical relation between investments and production seems to be very weak in the case of Czech national accounts in this period.

### *Value added*

Undercounting of capital expenditure in the system of national accounts is considered to be the reason for weak connection of investments with production. The logical consequence is that the concept of value-added does not display the real range of economic activity<sup>31</sup> (revenues and expenditures) that creates this value-added. This fact is caused by methodology of GDP computation, i.e. the exclusion of many production expenditures from this indicator which has far-reaching implications.

Let's consider some economic activity creating zero added value. Purchases of inputs (so-called intermediate production) were made and then used in forming production. With the aid of these inputs and factors of production, goods or services are produced and sold on the market. If the producer does not reach the price sufficient to cover production expenses (excluding compensation of employees and other expenses<sup>32</sup>), the result will be zero or even negative added value. This corresponds with the situation of erroneous entrepreneurial presumption about future market data<sup>33</sup>. It is evident that real economic activity was carried out. Many inputs and factors of production were used up in the process of production. But because of the zero added-value, this activity is escaping from the perspective of GDP. Put in different way, this activity does not exist from the GDP's point of view.

The discussion now turns to the question of full coverage of capital expenditures in GDP, i.e. the exclusion of the intermediate consumption, which is a standard practice in the national accounts system. Methodology of GDP understands as an intermediate consumption acquisition of small tangible assets, energy and services consumption, including for example operational leasing of equipments, marketing expenses, storage expenses, etc. All of these expenses are excluded from GDP<sup>34</sup>, even if there are expressions of real economic activity, use

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<sup>31</sup> In general, we can define the economic activity as an endeavor to improve the present living condition in the condition of scarceness. The economic activity is displayed by consumption and (mainly) production.

<sup>32</sup> In the computation of value added (for example in the case of non-financial corporations) is only part of total costs included in the intermediate consumption, whilst in the production are included almost 75 percent of receipts. It is not unusual that the main source of agent incomes are interests, rents, etc. This incomes are not included in the value-added computation. Value added of this subjects can be even negative, while disposable income is usually noticeably positive.

<sup>33</sup> But the methodology of the national accounts in essence doesn't allow the situation of negative value added.

<sup>34</sup> As well as acquisition of estates, licences, etc.

of scarce resources. So, when revenues do not exceed expenditures, GDP tells us that there was no economic activity. But the opposite is true.

### *Consumption and savings*

To record total economic activity, all revenues (expenditures) spend in the economic system within a given period have to be recorded in the indicator of economic activity. But according to mainstream economists, we would make a mistake called „double-counting error“. We should avoid this mistake by excluding intermediate consumption<sup>35</sup>. If the aim of our endeavor is to construct economic indicator showing total added value, this is without any doubt an appropriate approach. But if we want to obtain an indicator of total economic activity, we cannot exclude large part of revenues (expenditures) related to the intensity of usage of scarce resources, i.e. capital goods<sup>36</sup>. Furthermore, there are many transaction not included in production and intermediate consumption at all.

Thus, if we want to detect the fluctuation in total economic activity we cannot put aside majority of transactions. According to classical economics, the focus lies in production, i.e. larger part of annual production is intended for production purposes. „*Consumption in the necessary order of things is the effect of production, not production the effect of consumption.*“<sup>37</sup> But in the case of GDP, almost three quarters of GDP are made by consumption. Dominant position of production expenditures in an economic system is also confirmed by data from the national accounts system. In the case of the Czech Republic, intermediate consumption<sup>38</sup> to production ratio amounts to 60 percent, intermediate consumption to value-added ratio amounts to even greater proportion of 150 percent.

Driving force of economic activity is necessarily production, and not consumption. This follows from the fact that what is available for consumption had to be produced before<sup>39</sup>. Importance of consumption is valid on the level of an individual firm because of the existence of demand for given good or service provided by this firm is necessary condition for the operation of this firm. But on the level of an economic system as a whole, the consumption is fully dependent on the production.<sup>40</sup> Because productive expenditures are a large part of total economic activity, GDP records the turns in the development of total economic activity with delay.

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<sup>35</sup> „To exclude double counting, we will endeavour to include in gross domestic product only final goods and not capital goods that are used in the process of production.“ Samuelson [1995], p. 109.

<sup>36</sup> Reisman [1996]

<sup>37</sup> Reisman [2006], p. 8

<sup>38</sup> Which are only a part of total productive expenditures.

<sup>39</sup> Johnsson [2002]

<sup>40</sup> Reisman [1996], p. 696

Reisman [1996] shows on the base of classical economy the substantial function of savings, i.e. that higher propensity to save results in the growth of investment expenditures enlarging production capacity. Process of production then generates more incomes for factors of production such as a wages, profits, dividends, interests, which are in the next round used for consumption, or saved. This linkage between savings and volume of consumption goods indicates that savings do not ruin production because of decreasing demand, but on the contrary, the existence of savings enables the production of capital goods and then of the consumption goods to increase.

Application of GDP (value-added concept) for description of business cycle seems to be problematic also in other aspects. In the view of GDP a producer does not produce a whole of his product, but only a part of it, i.e. value-added<sup>41</sup>. But in reality, we purchase total product and producer gains the whole of the monetary value of his product, not only a part. If we take into consideration just a profit, or, to be more specific, a part of total profit (production minus intermediate consumption), than we consider total economic activity fluctuation by only a part of total economic activity. Reisman describes the approach of mainstream economists towards error of „double-counting“ as follow: *„it is an error to claim that all that is produced, is in fact produced.“*<sup>42</sup>

Another problem arises from the definition of productive activity. As Reisman points out the productive activity is *„activity the purpose of which is the earning of money.“*<sup>43</sup> The methodology of national accounts specifies the production boundary in a narrower sense: productive activities are only those activities creating added value. For example making money on interest differential is not a productive activity in the approach of national accounts methodology. Due to this fact also interests, dividends, rents, etc. are not included in the indicator of total economic activity fluctuation.

As a result, there are many arguments against the application of GDP for description of business cycle. According to the theory, greater part of total expenditures is formed by production expenditure, investments. Consequently, it is appropriate to push forward an emphasis towards investment expenditures, towards production of capital goods which production is subject to more considerable fluctuation. Investment expenditures are most sensitive expenditure to changes of monetary condition and are in the center of cyclical movements<sup>44</sup>. From the above-mentioned reasons, Reisman has constructed an alternative indicator (GDR) which is more suitable for characterization or description of cycles.

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<sup>41</sup> Recall the „double counting error“.

<sup>42</sup> Reisman [1996], p. 677

<sup>43</sup> dtto, p. 443

<sup>44</sup> Röpke [1936]

### 3. GDR

Evolution in the financial sphere of an economy has a significant impact on the real sphere. Volume of credits, stock prices, prices of bonds, interest rate, payment morality, all these „financial“ factors determine desire to save, to invest, to extent a production capacity, to consume. Monetary theory of a business cycle regards a disruption of monetary conditions (equilibrium) as a trigger mechanism of a business cycle.<sup>45</sup> This disruption is characterized especially by artificially low interest rate<sup>46</sup> and excessive credit expansion of fiat money. The result is an artificial rise in revenues, profits<sup>47</sup>, which change entrepreneurs' decisions<sup>48</sup> and allocation of scarce resources. We are caught in the situation called „calculation chaos“, in the world of exaggerated profits and undervalued costs.

The impressions of improved profit and loss statement usually cause increasing economic activity, extension of production capacities. Rising demand for factors of production is followed by rising prices of inputs, capital goods, which in long-term horizon lead to worsening of cost conditions. The reason is restricted supply of capital goods together with unchanged consumers' preferences<sup>49</sup>, the supply of capital goods cannot satisfy demand in the phase of boom. Lack of capital goods and increasing prices of capital goods end the phase of economic boom<sup>50</sup>.

Excessive demand for capital goods is enabled by the expansionary credit emission that can increase credit volume above the amount that would be in accordance with consumers' behavior regarding consumption and savings. To invest into extension of production capacity assumes higher demand of consumers and, simultaneously, resources release from production of consumers' goods, i.e. savings formation which served as a source of investments. Realization of investments without change in preferences is enabled only due to additional issue of new funds (fiat money). Investment carried out by additional money will turn out as bad investments in the future.

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<sup>45</sup> Here we can mention the difference between business fluctuation caused by technological changes, changes in the preferences, etc. (real business cycle) and monetary business cycle caused by changes in the monetary conditions.

<sup>46</sup> To the intent that interest rate set by central bank and natural interest rate generated by real economy. Wicksell [1907]

<sup>47</sup> Increasing amount of money will influence the income side, cost side of the profit and loss statement is influenced by excessive monetary expansion in the second row.

<sup>48</sup> But also consumers.

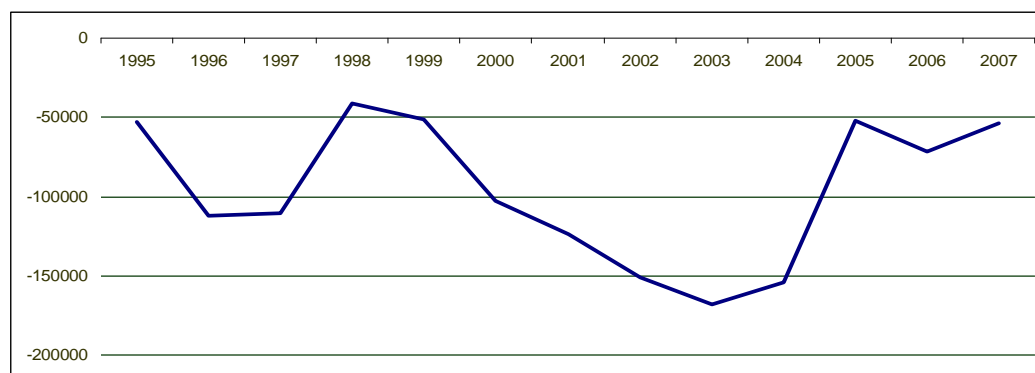
<sup>49</sup> In other words, there is no transfer of sources from the productions of consumption goods to the productions of capital goods, because consumers didn't change at all or in the sufficient level their preferences. This situation correspond to so-called „enforced savings“, lower real savings that investments.

<sup>50</sup> This development is inevitable, if the investments are financed by expansive monetary policy. Hayek [1935]



Note that investments based on real savings can also turn out to be erroneous, because entrepreneurs make mistakes in their forecasting of future market data. But we examine the situation where a large number of entrepreneurs make bad decisions, so we consider making mistakes in such extent that this cannot be reduced to bad presumption of consumers' preferences<sup>51</sup>. As it will be showed later on, the reasons are rapid changes in money supply creating unstable monetary condition, or put differently - „calculation chaos“<sup>52</sup>. Relation between savings, consumption and investments are shown in the following chart.

**Chart 2: Difference between savings<sup>53</sup> and investments (1995-2007), mil. CZK**



**Source: national accounts (CZSO), Balance of Payment statistics (CNB), own computation**

Chart 2 shows the difference between savings and investments. It is evident that in the case of the CR savings did not reach the level of investments made in the long term, regardless of the phase of the business cycle<sup>54</sup>. The amount of investments is pulled away from the amount of savings. This development is not natural, as Röpke wrote: „...*the capital formation (investment) must be balanced by a restriction of consumption.*“<sup>55</sup> Restriction of consumption is necessary condition for savings formation which amount then restricts the amount of investments.

<sup>51</sup> In the case of consumers it is the matter of bad presumption of real purchasing power.

<sup>52</sup> In general, under the term „calculation“ we understand the decision about the application of scarce resources. As a calculation chaos we understand the situation in which the external conditions leads to broad malinvestments, lowering of production capacities and inability to pay off a credit, because of inappropriate evaluation of costs and revenues.

<sup>53</sup> Savings are calculated as a sum of savings generated by domestic economy (S.1) and inflow of foreign sources (financial accounts of balance of payments, exclude financial derivatives).

<sup>54</sup> It is also not possible to say, that the savings in the phase of recession (when we suppose limited range of investment opportunities) are than invest in the phase of expansion.

<sup>55</sup> Röpke [1936], p. 99

As we see in the chart above, the amount of investments persistently exceeds the amount of savings. These conditions are enabled by the issue of additional money instruments which support demand for capital goods and factor of productions. Excessive rise in prices of inputs and then consumer prices is the inevitable consequence of this policy. This growth in prices lowers real consumption, which is precisely the condition for creation of savings. But in this case, consumption is lowered by so-called “enforced savings” as a consequence of expansion of medium of exchange.

So events in the sphere of consumption goods are only outgrowth of the development in the sphere of capital goods. Growth in prices of production goods pushes up prices of consumption goods and, on the contrary, makes the purchasing power of consumers lower. Then slump in economic activity comes up, usually supported by growing interest rate of the central bank as a reaction to rising prices of consumption goods (and not production goods). This is the reason, why for example production price index or index of producers’ prices (industry, agriculture, services, etc.) belong among so-called „advanced indicators“.

Reisman (1996) suggests indicator of total economic activity that will fully display the business cycle (economic activity respectively) fluctuation<sup>56</sup> - „gross domestic revenue“ (GDR). This indicator can show not only expenses for consumption but also for production goods that is by the theory considered as a dominant part of economic activity. Thanks to this fact GDR really displays total economic activity. The construction of GDR is completely based on the items of national accounts<sup>57</sup>.

First we summarize total uses in the economy (TU), i.e. uses side of goods and services account. On this account, there are summarized the amounts of final consumption expenditures (FCE), intermediate consumption (IC) and export of goods and services (EX).

$$TU = FCE + IC + EX$$

When gross operating surplus (GOS) is subtracted from TU<sup>58</sup>, we obtain costs other than depreciation (d). This item represents expenses for the production purposes that are mostly away from the attentions of the GDP<sup>59</sup>.

$$d = TU - GOS$$

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<sup>56</sup> Without necessity of application supplementary indicators and displaying business cycle development as indicated monetary theory of business cycle.

<sup>57</sup> Johansson [2002]

<sup>58</sup> To exclude the double counting in the following procedure of GDR compilation.

<sup>59</sup> Some part of this costs influence the GDP as a intermediate production.

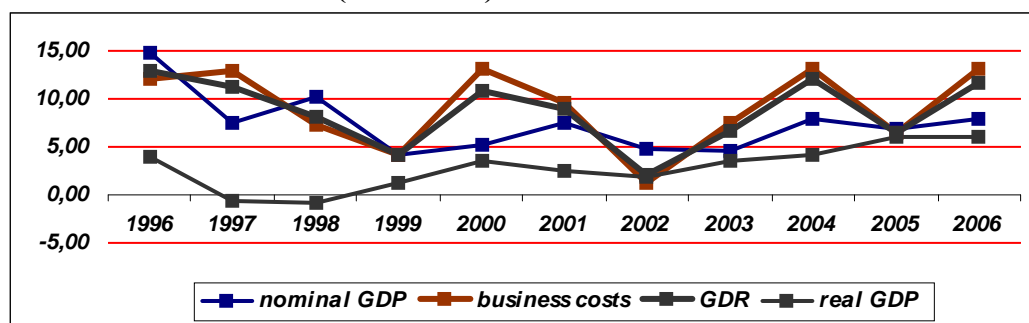
Now we can get GDR as a sum of GDP and cost other than depreciation.

$$GDR = GDP + d$$

As we can see, GDR contains consumption expenditures (final consumption, export) and production expenditure (intermediate consumption, investments). By including all of the expenditures for consumption and production purposes, this indicator has the ability to show changes in the economic activity sooner than GDP, because GDR, contrary to GDP, concentrates mainly on the process of production. The fluctuation of GDR is more volatile, because the majority of this indicator is made by production expenditures that fluctuate very strongly and are more sensitive to monetary policy.

Let us illustrate the difference between GDR and GDP in the case of the Czech Republic. Following chart compares the development of nominal and real GDP, GDR and business costs (BC)<sup>60</sup>. It is clear that fluctuations in GDR are more significant and in essence, this fluctuation is formed by fluctuation in production expenditures which is the logical consequence of dominant role of production in economic activity together with dominant role of production expenditures in the GDR indicator.

**Chart 3: Year-to-year changes in nominal and real GDP, GDR and business costs in the CR (1996-2006)**



Source: Rybacek [2008]

Such a graphic analysis of GDR is not sufficient for business cycle fluctuation analysis. Increasing money stock results in increasing amount of revenues (expenses), this coherence is in essence tautological. The crucial point here is the purpose which are additional funds used for. There are two alternatives, newly issued money can be used in exchange either for consumption or for investment goods.

<sup>60</sup> Expenditures made for the purpose of production,  $B = I + d$ , where  $I$  is investments as understand in the case of national accounts.

This different effects on different groups of prices and incomes is the crucial point of the business cycle mechanism. Because newly issued money will be received, sooner or later, by entrepreneurs (producers), it is primarily the demand for investment goods that will be encouraged. The amount of investment expenses is rising more rapidly than consumption goods. For that reason, the turning point in the business cycle lies in the sphere of production of capital goods. In other words, boom and bust aren't induced by changes in consumption but in production process creating goods, services and incomes.

In the phase of boom, share of investment expenses in GDR rises. On the contrary, the phase of bust is characterized by increasing share of consumption expenses because of unfavorable prospect of the economy and readiness to invest. Restricted investment expenses<sup>61</sup> in the phase of bust will result in decreasing exploitation of factors of production and diminishing amount of production creating incomes that are necessary for subsequent consumption. As a consequence, rising prices of consumption goods caused by strong demand and lack of capital at the end of the boom is replaced by decreasing prices at the turning point of the economic activity. Hence, again, economic turns can be seen in the production sphere of the economy.

Because the reason for the fluctuation caused by changes in monetary conditions is decreasing dynamics of investment expenses, which are in most not included in GDP, identification of the position in business cycle can be significantly different by application of GDP and GDR. The difference is convincingly showed by Johnsson<sup>62</sup>. GDR is strongly oriented on production and because consumption is necessarily preceded by production, GDR shows changes in the business cycle development of the economy sooner than GDP.

As was already mentioned, the rate of monetary emission as a consequence of the changes in interest rates will be immediately recorded in the development of the GDR, because new money will become receipts (costs) of economic subjects immediately. In other words, GDR will display the effect of the change in monetary policy on real economy with a very short delay (in comparison to the GDP). In the following chapter, we will use this features of GDR for analysis of the change in monetary condition which is called monetary integration and for the process of business cycle synchronization.

#### **4. Monetary integration and the business cycle**

Integration into monetary union implies fixation of the exchange rate. By fixing the exchange rate, common monetary policy is enforced by simultaneous

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<sup>61</sup> The investment activity is furthermore weakened by decreasing profitability, worsening availability of credits. If the excessive monetary expansion would not keep on, the profits wouldn't be encouraged and wouldn't enable producer to repay credits.

<sup>62</sup> Johnsson [2002]

existence of the free capital movement. Different setting-up of the interest rates and arbitrage capital flow would give rise to pressure on rise or drop of the (fixed) exchange rate. This fact is well known as a so-called “impossible trinity”. By the monetary integration, the economy will give up not only the exchange rate, but also independent monetary policy.

The above mentioned facts are taken to be the costs of monetary integration. Elimination of the exchange rate risk and more transparent price comparisons are supposed to be the benefits of this process. The more are the benefits advantageous, the more intensive is the economy involved in international trade because this facts lead to business cycle synchronization. As a example can serve the international linkage of Czech and German economies. To be specific, because 40 percent of Czech export is intended for German markets, the economic growth of German economy can very strongly influence the business cycle of the Czech economy

If the economies are going through a similar business cycle fluctuation, they are regarded as appropriate candidates for monetary integration. The intensity of mutual business relation is emphasized in the essay of Frankel and Rose<sup>63</sup>, that also mention increasing specialization as a consequence of the withdrawal of foreign trade restrictions. But the business cycle synchronization will be enforced despite the increasing specialization, because of intra-branch trade. Zhang and Artis<sup>64</sup> examined the effect of ERM creation on business cycle synchronization. They conclude that policy disciplines imposed by this change in the monetary condition leads to the more tightly business cycle development among European countries.

Darvas a Szápary<sup>65</sup> also examined business cycle synchronization in the enlarged European Union on the base of empirical evidence. Their research based on the GDP points out the increasing synchronization of business cycle in the case of the „core“ of monetary union and also in the case of countries on the periphery of monetary union. It is also important to mention that the least synchronized component of GDP in the analysis of Darvas and Szápary was consumption<sup>66</sup>.

Following analysis draws attention also to the eurozone and its members' business cycle synchronization. Because of difficult availability of necessary data, the analysis is not oriented on all countries of the eurozone. The analysis is based on the assumption that GDR is better tool for business cycle description than GDP. We examine the hypothesis that synchronization of the business cycle will be enforced by monetary integration in the case of economies in which cycles has not been synchronized before the monetary integration.

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<sup>63</sup> Frankel, Rose [1998]

<sup>64</sup> Zhang, Artis [1995]

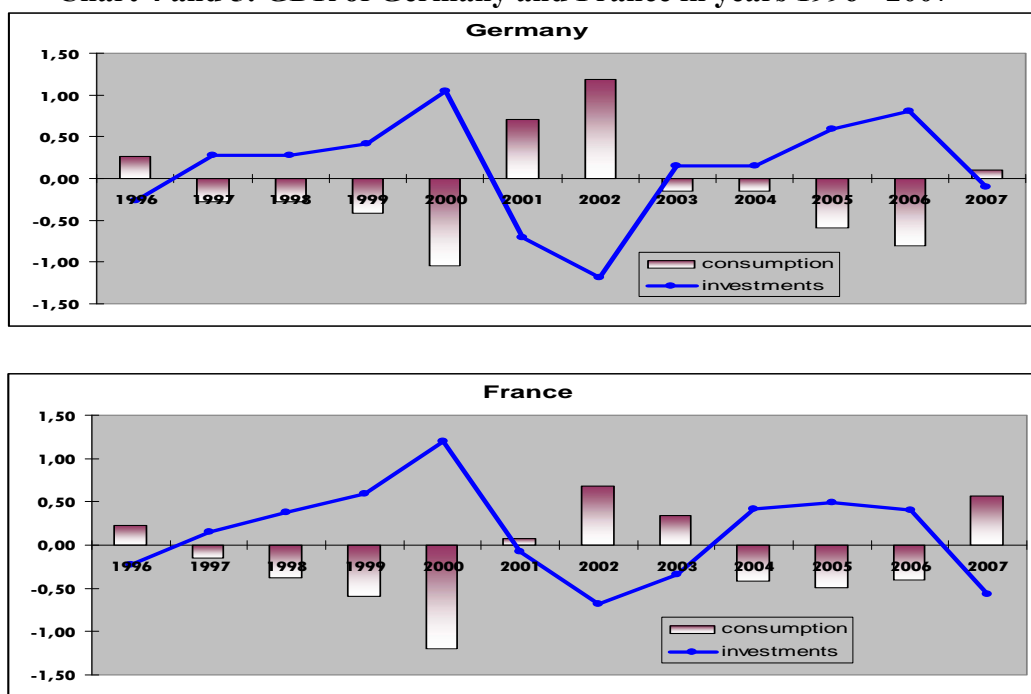
<sup>65</sup> Darvas, Szápary [2004]

<sup>66</sup> dtto. this phenomenon is also called „consumption-correlation puzzle“.

## 5. GDR and monetary integration

According to some authors<sup>67</sup>, business cycle synchronization is a self-enforced feature of the monetary integration. In other words, cycles can be synchronized by common monetary policy itself<sup>68</sup>. Is there some empirical evidence for this statement? As was mentioned above, GDP puts emphasis on consumption expenditures. But most sensitive to changes in monetary condition (as in the case of monetary integration) are investment expenditures. GDR gives us different picture of economic activity fluctuations. Let us have a look at so-called driving forces of the European integration, i.e. France and Germany.

**Chart 4 and 5: GDR of Germany and France in years 1996 - 2007**



**Source: Eurostat, own computation**

As we can see in charts 4 and 5, business cycles of these economies were fully synchronized already before the monetary integration which just goes to show the importance of mutual business relationships for business cycle synchronization. Naturally, the monetary integration did not disturb synchronized business cycle fluctuations. After monetary integration, business cycles in both of economies turned into boom with relatively strong increase in investment expenditures

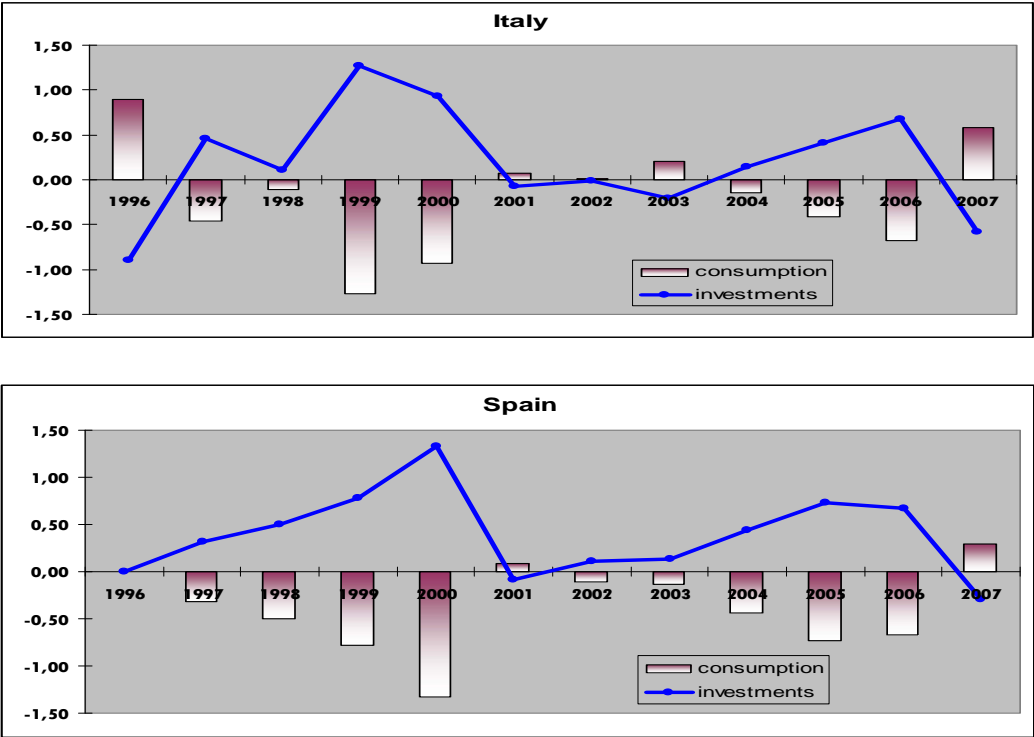
<sup>67</sup> Kwan [1998], Glavan [2004]

<sup>68</sup> Kwan [1998]

lasting till year 2006. In the year 2007 the business cycle of both of these economies turned into bust. Let us compare fluctuation in the above mentioned economies with business cycle in economies of Italy and Spain.

The business cycles of Italy and Spain were also synchronized before the monetary integration, partly each other, partly with already mentioned economies of Germany and France. We can conclude that business cycles of these economies were synchronized before as well as after the fully monetary integration.

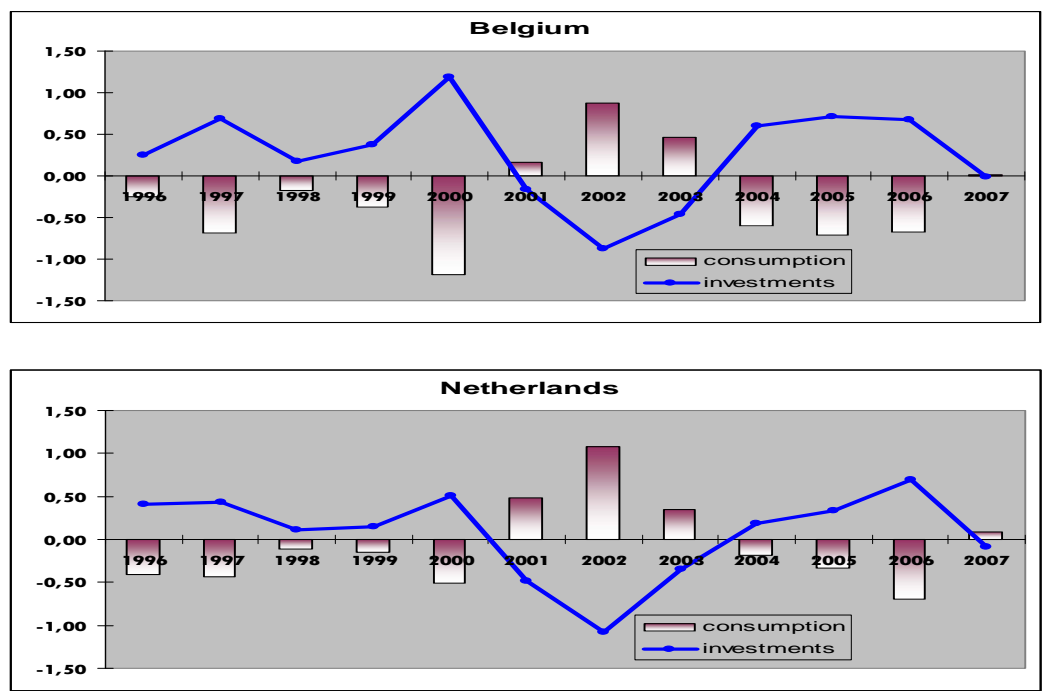
**Chart 5 and 6: GDR of Italy and Spain in year 1996 - 2007**



**Source: Eurostat, own computation**

Now we check fluctuation in economic activity in other two European countries, the Netherlands and Belgium.

**Chart 7 and 8: GDR of Belgium and the Netherlands in years 1996 and 2006**

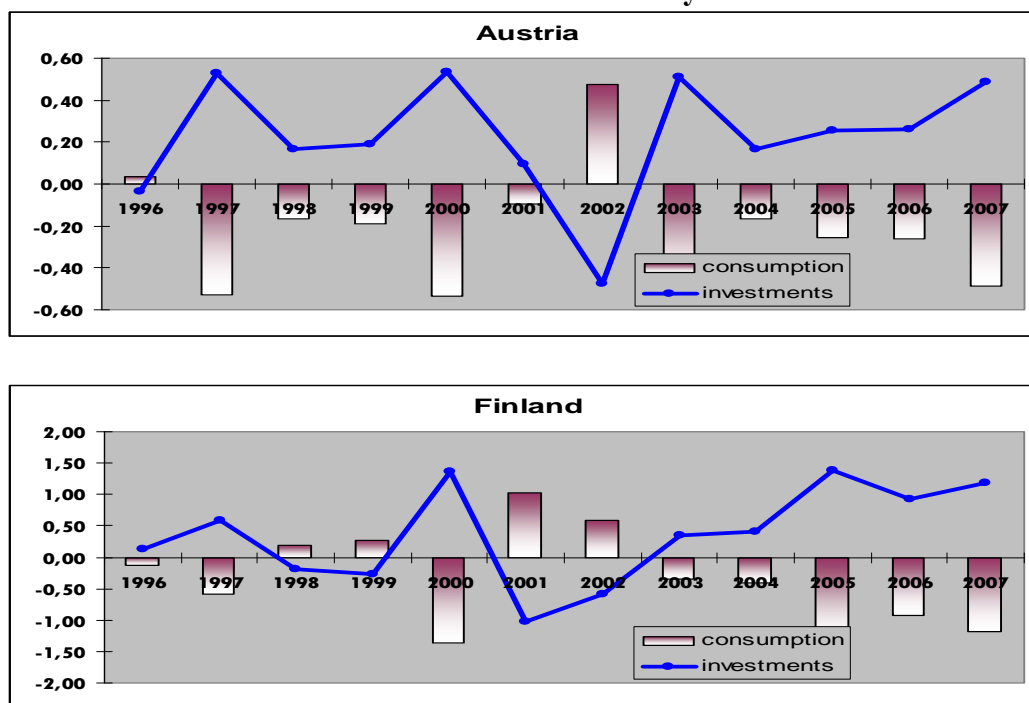


**Source: Eurostat, own computation**

Both economies have strong business contacts with their geographical neighbors, fist of all Germany and France. Strictly speaking, business cycle of this countries is synchronized with cycles of above mentioned countries before as well as after monetary integration. Countries, which we have examined yet show almost identical business cycle fluctuation in the whole period. Now we draw our attention to other countries, Austria and Finland.



**Chart 9 a 10: GDR of Austria and Finland in years 1996 - 2006**

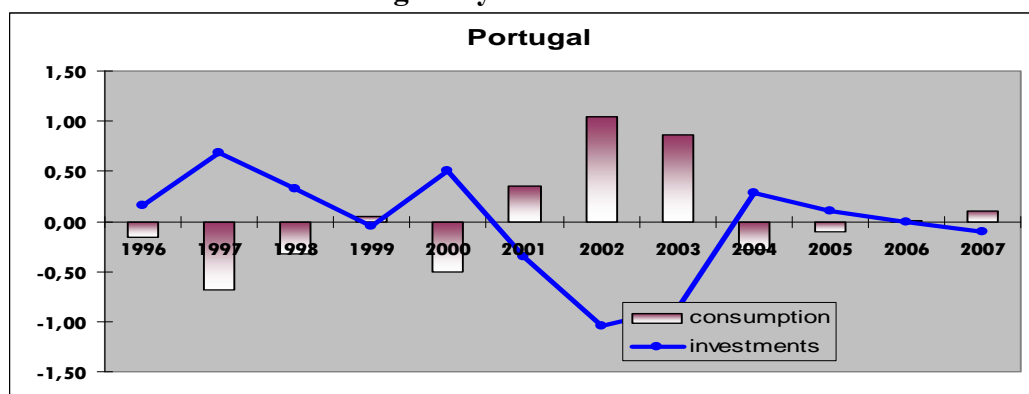


**Source: Eurostat, own computation**

Austrian economy is strongly connected to German economy, not surprisingly, Austrian business cycle is almost identical to the one in Germany. More interesting case is geographically more distant economy of Finland. The cycle of Finland is much more fluctuating between 1996 and 2002 than up to now examined countries. After the monetary integration, the business cycle synchronization got ahead, the share of investment expenditure started to increase in 2003. In the year 2007 we can see different course of the business cycles in comparison to other European countries.

Portugal is the last country with sufficiently long time series of necessary data. Business cycle in Portugal was very different from other countries which in 2003 created the monetary union. After the euro adoption, there is boom described as a growth in investment expenditures in comparison with consumption expenditures. Business cycle in the case of Portugal started to be synchronized after the monetary integration.

**Chart 11: GDR of Portugal in years 1996 - 2007**



**Source: Eurostat, own computation**

We can conclude that in the case of Portugal synchronizing influence of monetary integration has occurred. Portugal economy was in the situation of bust, even in year 2003. But then the development turns to the phase of boom lasting till year 2006.

As we have showed in our analysis, strong mutual relations make the business cycle synchronized. In the case of countries with different business cycle, monetary integration makes the business cycles synchronized (Finland, Portugal). This seems to confirm the hypothesis that monetary integration has a synchronizing effect on business cycle fluctuation, therefore, the business cycle synchronization is self-enforced feature of monetary integration.

## **5. Conclusion**

This analysis, based on the indicator GDR, shows that monetary integration seems to have an synchronizing effect on business cycle fluctuation of members economies owing to the effects of common monetary policy on investment activities. Based on this analysis we can suspect that business cycle synchronization really can be a self-enforced condition of monetary integration. In addition to that, because of general fall in investment expenses in year 2007 we can assume that current economic downturn had started in the biggest eurozone economies already more that one year before official downturn displayed in the GDP. In other words, significant changes in production process entailing in subsequent changes in consumption started already in 2007.

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